should be attached to this higher percentage. The formula for descloizite corresponds to those of adamite, libethenite and olivenite, being:

$$Pb_2[HO](VAsP)O_4 + Zn_2[HO](VAsP)O_4.$$

Iodyrite.

Frequently associated with the vanadates of the Sierre Grande, and implanted in calcite in straw yellow to bright sulphur-yellow imperfect crystals and crystalline masses. The best specimen which could be obtained was sent by the writer to Prof. G. vom Rath, who describes them as follows: "The crystals of iodyrite (yellow) are imperfect in "their formation, nevertheless they allow one to determine their form as "a combination of the hexagonal prism and the basal plane. The des- "cloizite shows large brown crystals of 4^{mm} in size and of older origin, "and smaller ones of light red color and of later origin, attached to the "iodyrite and calcite."

The spec. grav. of this variety was found to be 5 609, but the analysis was unfortunately lost, it was found qualitatively, however, that it was pure iodide of silver.

Another variety which is generally associated with the dark variety of descloizite and frequently implanted in it and leaving impressions on its planes, forms minute rounded crystals, rarely 1^{mm} in size, and shows sometimes little hexagonal prisms with basal plane; their color is mostly very pale greenish-yellow, seldom brighter. A qualitative test gave also pure iodide of silver.

University of Pennsylvania, April 16th, 1885.

The Chase-Maxwell Ratio. By Pliny Earle Chase, LL.D.

(*Read before the American Philosophical Society, April 17, 1885.*)

In 1872 (*Proc. Amer. Phil. Soc.*, xii, 394), Chase showed that the tendency of particles, in exploded gases, toward primary and secondary centres of oscillation, leads to a permanent *vis viva* of equilibrium which is $\frac{5}{9}$ of the *vis viva* of explosive projection, and that the synchronous action of the sun and the earth upon the oscillating particles furnishes a ready method for estimating the sun's mass and distance. He also showed (*Ibid*, p. 403–5), that the successive planetary positions in the solar system illustrate the influence of æthereal oscillations of a similar character. In 1875 he showed (*op. cit.*, xiv, 651), that the mean velocity of expanding gaseous pressure is $\frac{2}{\pi}$ of the corresponding constant velocity

of revolution ; the ratio of *vis viva* is, therefore, $\frac{4}{\pi^2} = .405285$, and we have

$$K : k : : 1.405285 : 1.$$

In 1877, Preston (*P. Mag.*, iii, 453 ; iv. 209), showed "that a physical relation exists between the velocity of the particles of a medium constituted according to the kinetic theory, and the velocity of propagation of a wave in the medium." Maxwell calculated the numerical value of this relation at $\sqrt{\frac{5}{9}}$, which represents Chase's ratio of relative *vis viva ;* but he did not give the method by which he reached that result, and no record of it was found among his papers. The following thermodynamic demonstration may, therefore, be satisfactory to those who have found any difficulty in accepting the more simple and more general photodynamic proof, which is furnished by reference to oscillatory centres.

If we represent the density of a gas, $\frac{nm}{v}$, by ρ, the fundamental equation of pressure becomes

$$p_\mu = \frac{\rho c^2}{3} = \frac{p_0}{3} \quad \ldots\ldots (1)$$

Alexander Naumann, (*Ann. Pharm.*, 1867, 142, 267 ; *J. B.*, 1867, 62) showed that

$$\mu = \frac{3}{2}(\gamma' - \gamma) \quad \ldots\ldots (2)$$

μ being the heat of molecular motion, or mean *vis viva* of a perfect gas ; γ', the specific heat under constant pressure ; γ, the specific heat under constant volume ; $\gamma' - \gamma$, the heat of expansion, or *vis viva* of mean velocity. The total specific heat is, therefore,

$$\theta = \mu + \gamma' - \gamma = \frac{5}{3}\mu \quad \ldots\ldots (3)$$

Hence, $p_\theta : p_0 : : 5 : 9$ ..... (4)

$v_\theta : v_0 : : \sqrt{5} : 3$ ..... (5)

Prof. d'Auria, in a special investigation relating to the dynamics of direct-acting pumping engines, not yet published, has found, by analogy, that

$$\mu = \frac{6\gamma}{\pi^2} = .607927\gamma \quad \ldots\ldots (6)$$

Substituting this value in eq. (2) we get Chase's result :

$$\gamma' - \gamma = .405285\gamma \quad \ldots\ldots (7)$$

$$\gamma' = 1.405285\gamma \quad \ldots\ldots (8)$$

The exactness of agreement between this *a priori* value and the one which was found by Röntgen (1.405 3 ; *Pogg*, 1873, 148, 603), is very remarkable.